Southeastern Wisconsin Regional Water Supply Planning Program Overview And Challenges

SOUTHEASTERN WISCONSIN REGIONAL PLANNING COMMISSION

KENOSHA · WALWORTH · WASHINGTON · WAUKESHA · OZAUKEE · RACINE · MILWAUKEE

State of Wisconsin Groundwater Advisory Committee

February 2, 2006

#115416

Southeastern Wisconsin Regional Water Supply Planning Program Overview And Challenges

- Regional Setting
- Water Supply Issues
- Regional Water Supply Planning Program – Background and Initial Status Report
- Water Supply Planning Challenges

Southeastern Wisconsin Regional Water Supply Planning Program Overview And Challenges

A Cooperative Program…

SE Wisconsin Water Utilities

USGS science for a changing world

KENOSHA·MILWAUKEE·OZAUKEE·WAUKESHA·WASHINGTON·WALWORTH·RACINE
SOUTHEASTERN WISCONSIN REGIONAL PLANNING COMMISSION

Seven Southeastern Wisconsin Counties

WISCONSIN DEPT. OF NATURAL RESOURCES

UNIVERSITY of WISCONSIN UWMILWAUKEE

UW Extension
Wisconsin Geological and Natural History Survey

Southeastern Wisconsin Regional Water Supply Planning Program Overview And Challenges

Areas Served by Public and Private Water Supply Systems in Southeastern Wisconsin: 2000

2,700 Square Miles
(62% west of Divide)

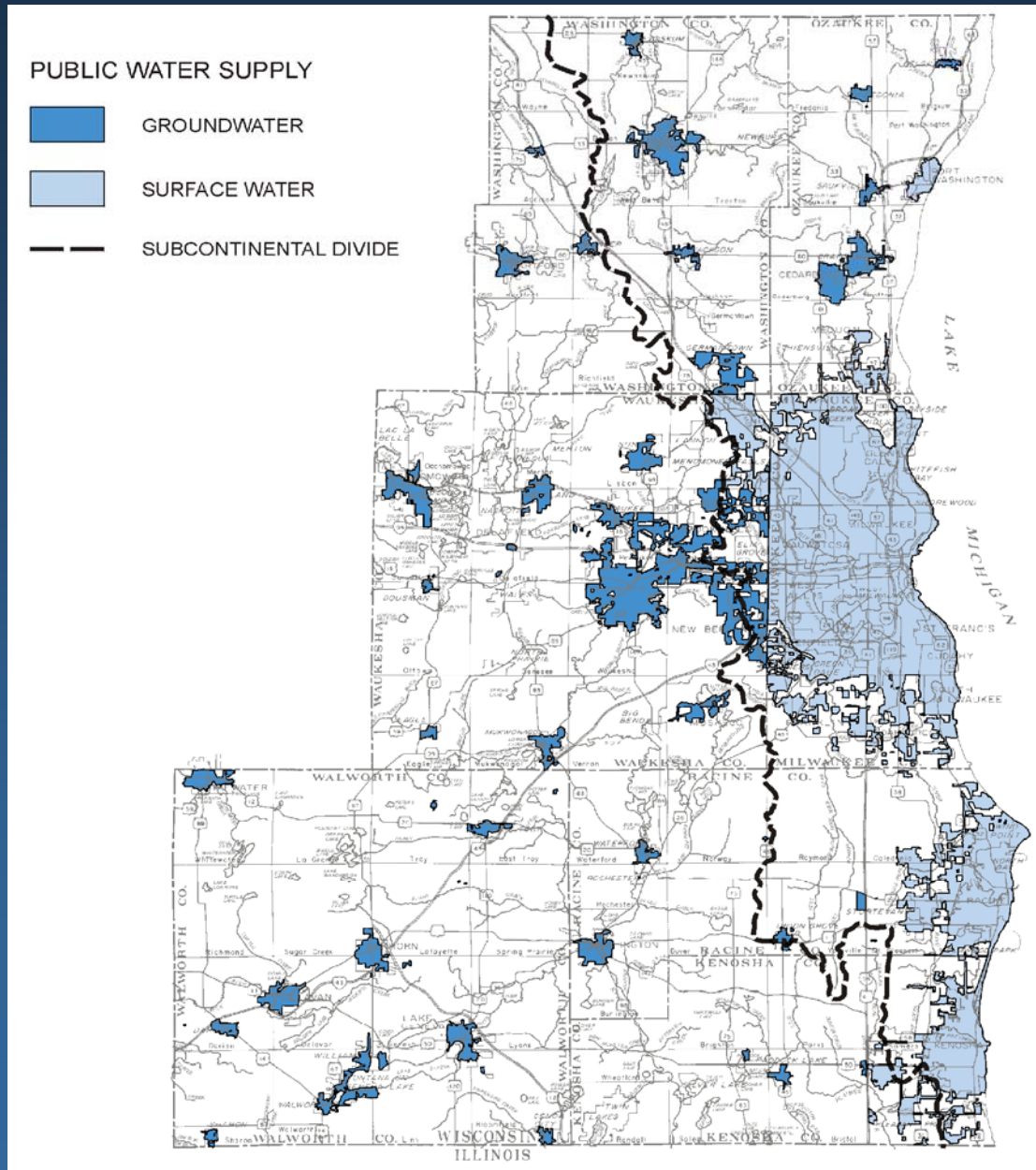
2.0 Million People

Public Water Supply

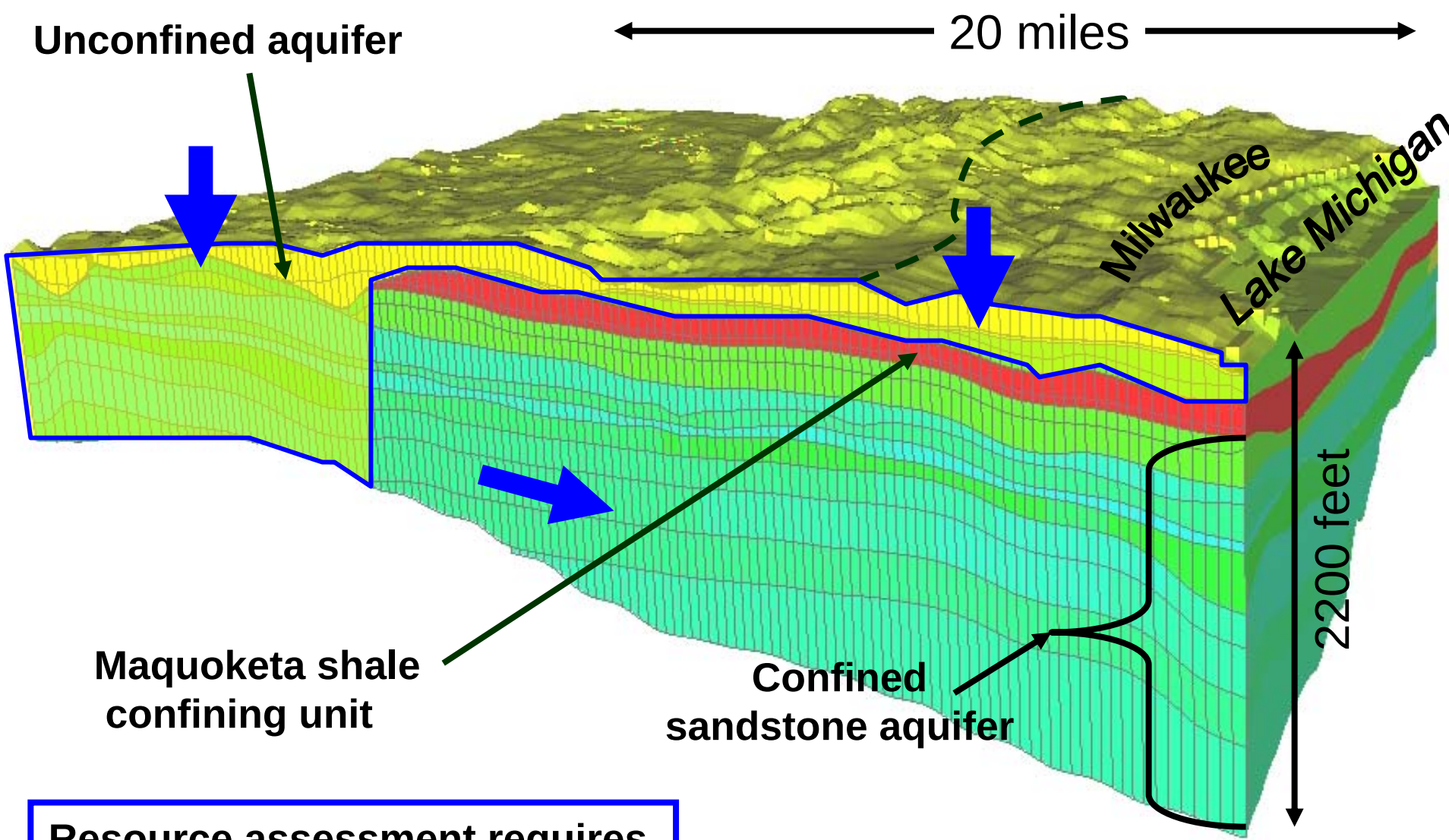
- Lake Michigan
  - Nine Plants (30 systems)
  - 1.2 Million People
  - 210 mgd
- Groundwater
  - 50 Systems
  - 400,000 People
  - 55 mgd

Private Water Supply

- 400,000 People
- 40 mgd



General Hydrogeology of Southeast Wisconsin



Resource assessment requires knowing recharge and inflows

Source: USGS

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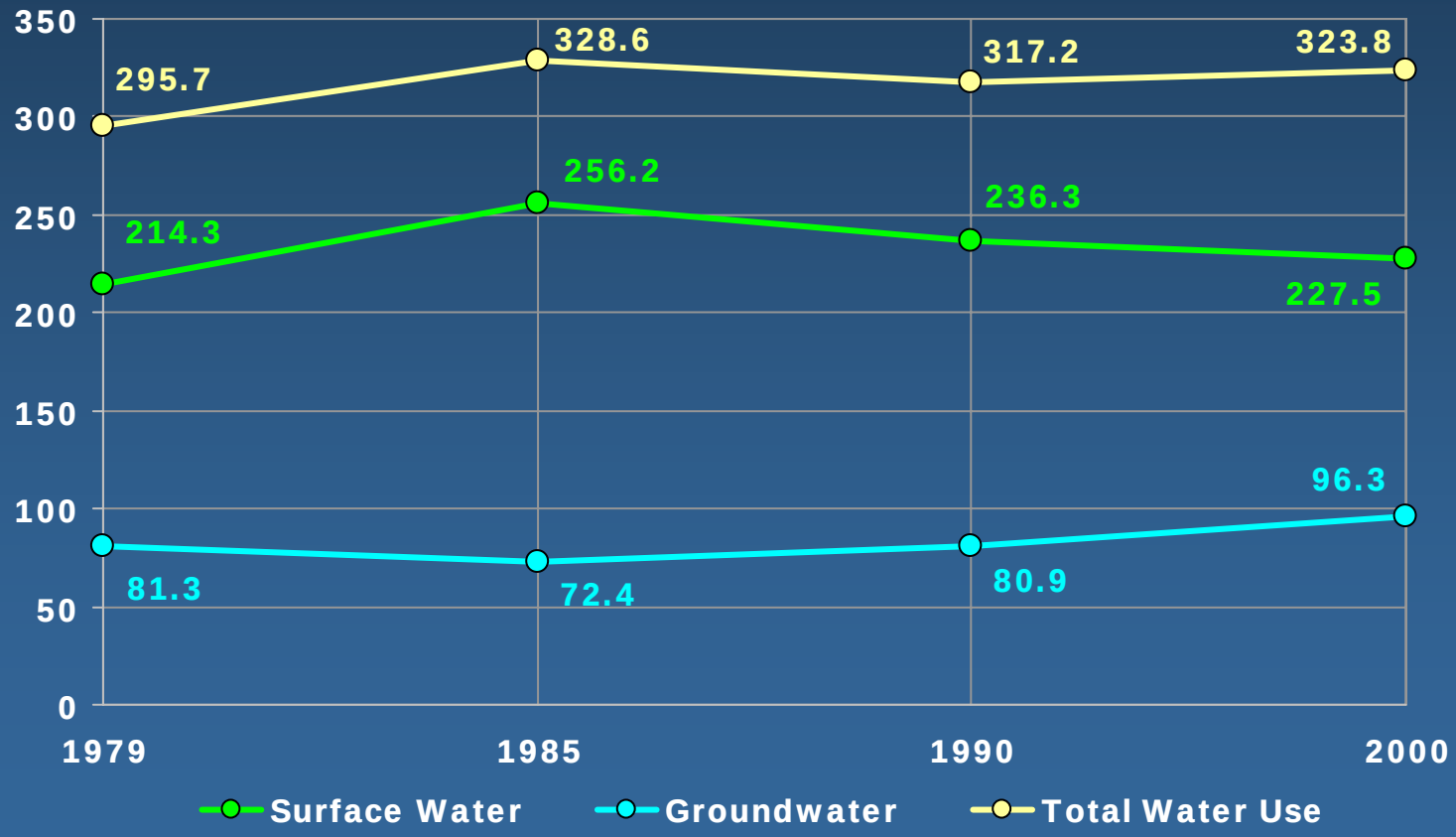
Trends in Water Use for the Region: 1979-2000 (in Million Gallons Per Day)*



* Excludes thermoelectric power generation uses

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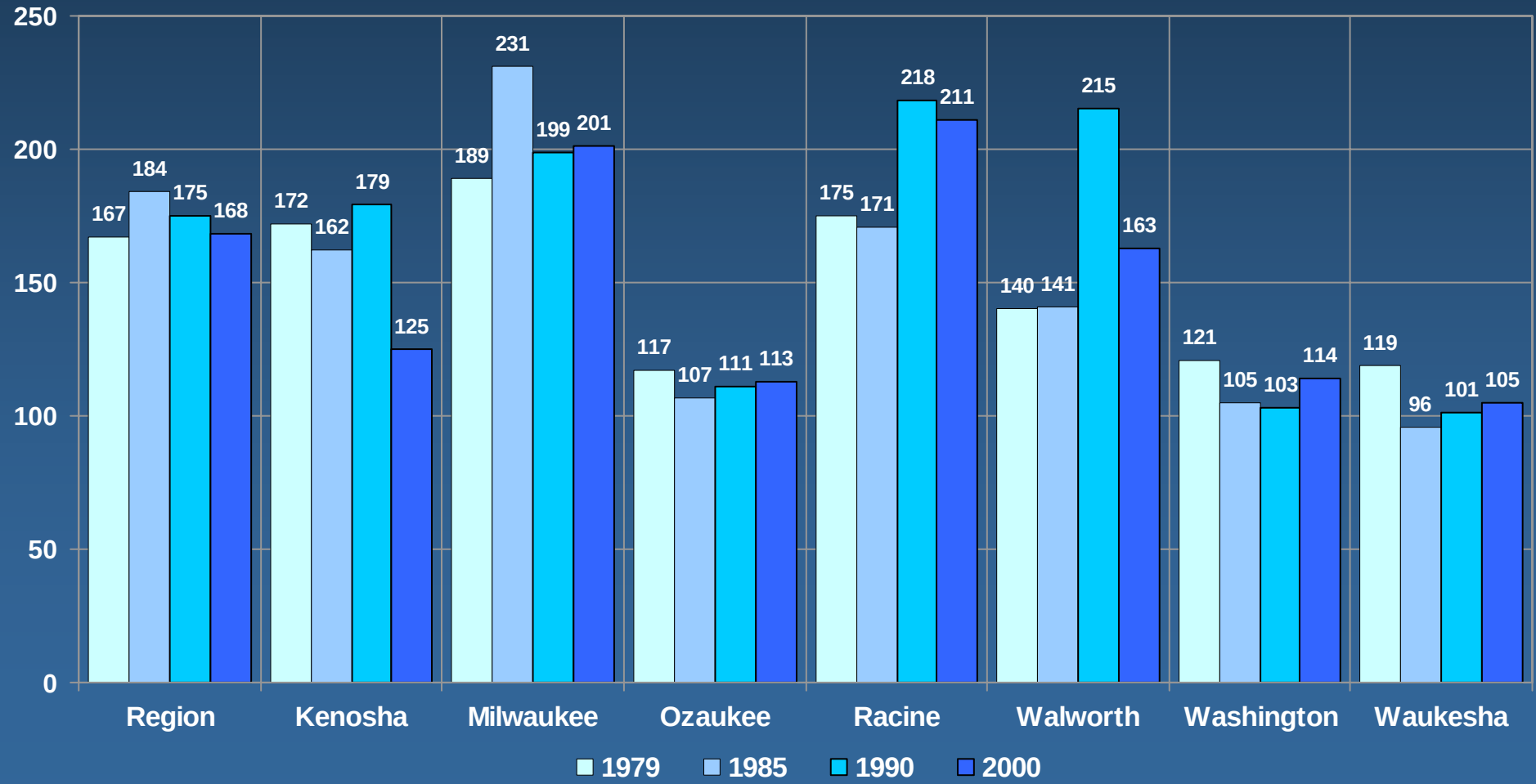
Historic Per Capita Water Use in the Southeastern Wisconsin Region: 1979-2000 (Gallons Per Person Per Day)



Southeastern Wisconsin Regional Water Supply Planning Program Overview And Challenges

Summary Of Public (Municipal) Water Use In The Southeastern Wisconsin Region By County: 2000

County	Average Annual Water Uses										Percent Unaccounted for Water
	Residential Water Use			Industrial Water Use		Commercial, Institutional, Multi-Family Residential, and Miscellaneous Water Use		Other Municipal Water Uses (gallons per acre per day)	Total Municipal Water Use		
	Total (gallons per day X 1,000)	Per Person (gallons per capita per day)	Per Acre (gallons per acre per day)	Total (gallons per day X 1,000)	Per Acre (gallons per acre per day)	Total (gallons per day X 1,000)	Per Acre (gallons per acre per day)		Total (gallons per day X 1,000)	Per Person (gallons per capita per day)	
Kenosha	5,619	61	836	1,926	2,362	3,160	828	2,451	13,156	119	12
Milwaukee	51,942	70	1,282	30,462	5,320	35,413	1,516	30,561	148,378	160	7
Ozaukee	2,570	64	581	1,999	4,123	808	424	198	5,575	123	14
Racine	7,804	61	832	10,235	7,482	3,666	818	3,625	25,330	175	12
Walworth	2,565	57	474	1,270	2,023	1,764	574	651	6,250	111	16
Washington	3,488	66	724	1,287	1,843	1,405	471	231	6,411	96	13
Waukesha	11,404	60	506	3,720	1,239	7,308	646	661	23,093	102	11
Total Region	85,392	67	911	50,899	4,001	53,524	1,051	38,378	228,193	145	9

Source: Public Service Commission of Wisconsin and SEWRPC.

Southeastern Wisconsin Regional Water Supply Planning Program Overview And Challenges

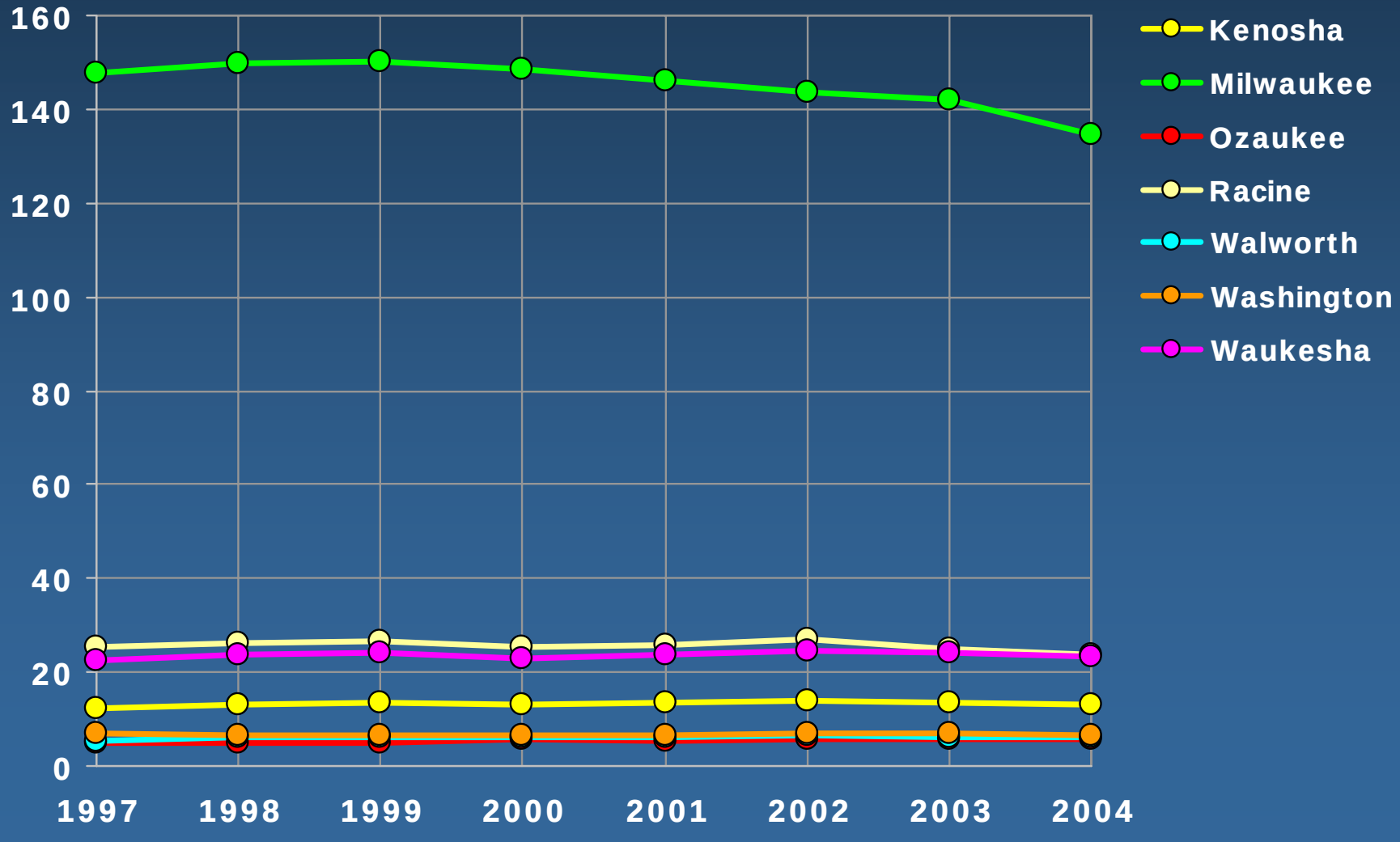
Recent Trends In Municipal Water Use By County: 1997-2004

County	Total Municipal Water Use (million gallons per day)							
	1997	1998	1999	2000	2001	2002	2003	2004
Kenosha	12.4	13.2	13.5	13.2	13.7	13.8	13.7	13.2
Milwaukee	147.6	149.6	150.1	148.4	146.0	143.6	142.1	134.8
Ozaukee	4.7	4.9	4.7	5.6	5.3	5.7	5.7	5.7
Racine	25.2	26.4	26.6	25.3	26.0	27.0	25.0	23.9
Walworth	5.3	6.0	6.1	6.3	6.3	6.6	6.3	6.0
Washington	7.1	6.6	6.5	6.4	6.7	6.8	6.8	6.7
Waukesha	22.3	23.5	24.0	23.1	23.7	24.6	24.3	23.5
Total Region	224.6	230.2	231.5	228.3	227.7	228.1	223.9	213.8

Source: Public Service Commission of Wisconsin.

Southeastern Wisconsin Regional Water Supply Planning Program Overview And Challenges

Recent Trends In Municipal Water Use: 1997-2004



Southeastern Wisconsin Regional Water Supply Planning Program Overview And Challenges

Major Issues

- Groundwater Supply Demand is Rising
- Overuse of the Deep Sandstone Aquifer Has Caused Large Cone of Depression – Up to 500 Feet of Drawdown
- Current Radium Exceedance Issues (22 systems in Southeastern Wisconsin and 53 in State)
- Quality of Deep Sandstone Aquifer Water Is Declining in Some Wells
- Potential for Contamination and Surface Water Impacts with Increased Use of the Shallow Aquifer

Southeastern Wisconsin Regional Water Supply Planning Program Overview And Challenges

Regional Water Supply Planning Program – Three Elements (Coordinated With And Designed To Complement Local Actions)

- Conduct Basic Groundwater Inventories (Completed in 2001 With Partners—WGNHS and WDNR)
- Collect Additional Inventory Data and Develop Regional Aquifer Simulation Model (Completed with Partners—USGS, WGNHS, UW-Milwaukee, WDNR, and SE Wisconsin Water Utilities)
- Prepare Regional Water Supply System Plan (Planning is Underway With Support from Seven Counties in Southeastern Wisconsin)

Southeastern Wisconsin Regional Water Supply Planning Program Overview And Challenges

Regional Water Supply Planning Advisory Committee

Kurt W. Bauer, Chairman	Executive Director Emeritus, SEWRPC
Robert P. Biebel, Secretary	Special Projects Environmental Engineer, SEWRPC
Julie A. Anderson	Director, Racine County Division of Planning and Development
Daniel A. Barthold	Environmental and Energy Engineering Director, Miller Brewing Company
Kenneth R. Bradbury	Hydrogeologist/Professor, Wisconsin Geological and Natural History Survey
Thomas J. Bunker	General Manager, Water and Wastewater Utility, City of Racine
Douglas S. Cherkauer	Professor of Geology, University of Wisconsin-Milwaukee
Lisa Conley	Representative, Town and Country Resource Conservation and Development, Inc.
Michael Cotter	Director, Walworth County Land Use and Resource Management Department
Charles A. Czarkowski	Regional Water Program Expert, Wisconsin Department of Natural Resources, Southeast Region
Daniel S. Duchniak	General Manager, Waukesha Water Utility, City of Waukesha
Charles P. Dunning	Hydrologist, U.S. Geological Survey
Franklyn A. Ericson	Manager, Environmental Operations & Central Services, S. C. Johnson & Son, Inc.
David Ewig	Water Superintendent, City of Port Washington
Thomas M. Grisa	Director of Public Works, City of Brookfield
Raymond Grzys	Director of Utilities, City of New Berlin
Jeffrey A. Helmuth	Hydrogeologist Program Coordinator, Wisconsin Department of Natural Resources, Madison

Southeastern Wisconsin Regional Water Supply Planning Program Overview And Challenges

Regional Water Supply Planning Advisory Committee, contd.

Andrew A. Holschbach	Director, Ozaukee County Planning, Resources, and Land Management Department
Roger C. Johnson	Manager, North Shore Water Commission
Terrence H. Kiekhaefer	Director of Public Works, City of West Bend
Thomas J. Krueger	Water and Wastewater Utility Director, Village of Grafton
Carrie Lewis	Superintendent, Milwaukee Water Works, City of Milwaukee
Mark Lurvey	Agricultural Business Operator
Patrick Marchese	Member, Water Policy Advisory Panel, Public Policy Forum
George E. Melcher	Director, Kenosha County Department of Planning and Development
Matthew Moroney	Executive Director, Metropolitan Builders Association of Greater Milwaukee
Paul E. Mueller	Administrator, Washington County Planning and Parks Department
Jeffrey Musche	Administrator/Clerk, Town of Lisbon
Michael P. Rau	General Manager, We Energies-Water Services
Edward St. Peter	General Manager, Water Utility, City of Kenosha
Dale R. Shaver	Director, Waukesha County Department of Parks and Land Use
George A. Torres	Director, Transportation & Public Works, Milwaukee County Department of Parks and Public Infrastructure
Daniel S. Winkler	Director of Public Works and Utilities, City of Lake Geneva
Steve Yttri	General Manager, Water and Sewer Utility, City of Oak Creek

Southeastern Wisconsin Regional Water Supply Planning Program Overview And Challenges

Planning Challenges

OVERALL CHALLENGE – To Develop a Plan for the Provision of Long-Term Sources of High-Quality Water for the Southeastern Wisconsin Region

- Determine a Balance and an Efficient Management Program for Sources of Supply:
  - Lake Michigan
  - Shallow Aquifer
  - Deep (Regional) Aquifer (with treatment)
  - Precipitation
  - Infiltration Systems
    - Enhanced Precipitation
    - Wastewater (?)

Southeastern Wisconsin Regional Water Supply Planning Program Overview And Challenges

Organizational Structure

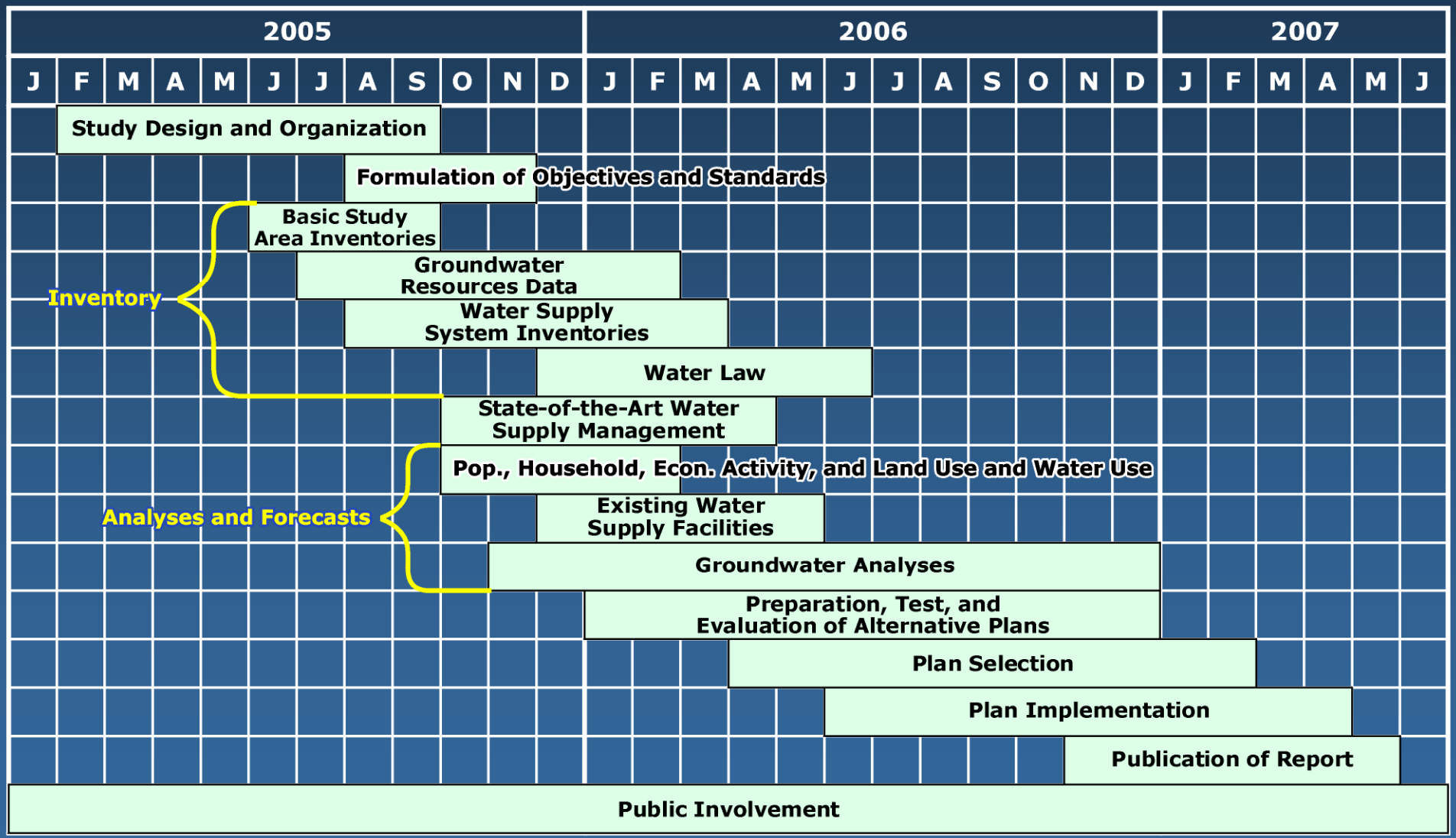
Preliminary Allocation of Work Tasks for SEWRPC Regional Water Supply Study

SEWRPC Staff[a]	Civil Engineering Firm	Law Firm	Wisconsin Geological and Natural History Survey/ U.S. Geological Survey/ UW-Milwaukee	SEWRPC Plan Documentation
•Overall project management •Develop objectives and standards •Basic planning inventories and analyses •Groundwater resources inventories (completed) •Water supply facilities inventories •Conceptual development of alternative and recommended plans •Environmental evaluation of recommended plan •Develop plan implementation recommendations •Planning report preparation •Public involvement activities	•State-of-the-art report (system design factors, facility costs and effectiveness, conservation measures) •Review and comment on water supply facility inventory procedures •Water supply technical analyses •Technical development and costing of alternative and recommended plans •Review and comment on plan implementation recommendations	•Water law report •Review and comment •on plan implementation recommendations	•Groundwater recharge analysis •Groundwater/development sustainability analyses •Evaluation of groundwater •and surface water impacts of alternatives and recommended plans •Review and comment on •plan implementation recommendations	•State-of-the-art technical report •Water law technical report •Planning report

[a]*Includes assigned UW-Extension agent.*

Southeastern Wisconsin Regional Water Supply Planning Program Overview And Challenges

Proposed Timing of Major Work Elements



Southeastern Wisconsin Regional Water Supply Planning Program Overview And Challenges

Major Plan Components

- Development of water supply service areas and forecast demand for water use – plan year 2035;
- Documentation of existing and potential water supply problems and issues;
- Development of recommendations for water conservation efforts to reduce water demand;
- Development and evaluation of alternative means of addressing the identified water supply problems and issues;
- Selection and documentation of a recommended plan;
- Identification of groundwater recharge areas to be considered for protection;
- Specification of any new institutional structures found necessary to carry out the plan recommendations; and
- Identification of any constraints to development levels in subareas of the Region due to water supply sustainability concerns.

Southeastern Wisconsin Regional Water Supply Planning Program Overview And Challenges

List of Chapters

- Chapter I—Introduction and Background
- Chapter II—Description of the Study Area
- Chapter III—Existing Water Supply Conditions in the Region
- Chapter IV—Legal Structures Affecting Water Supply Planning
- Chapter V—Water Supply System Development Objectives and Standards
- Chapter VI—Analysis and Forecasts
- Chapter VII—Existing and Forecast Water Supply Problems
- Chapter VIII—Alternative Plan Design and Evaluation
- Chapter IX—Recommended Water Supply System Plan
- Chapter X—Plan Implementation
- Chapter XI—Summary and Conclusions

Southeastern Wisconsin Regional Water Supply Planning Program Overview And Challenges

Basic Principles

- Water Supply System Planning Must Be Conducted Concurrently with, and Cannot Be Separated from, Land Use Planning.
- Land Use and Water Supply System Planning Must Recognize the Existence of a Limited Natural Resource Base to Which Urban and Rural Development Must Be Properly Coordinated to Ensure the Overall Environmental Quality of the Region.
- The Regional Water Supply System Plan is Intended to Provide a Framework Plan within Which Local Water Supply Facilities Planning Can Be Soundly Conducted.
- Water Supply System Planning in Southeastern Wisconsin Must Recognize the Constraints of Regulations and Policies Relating to the Ability of Obtain Water from the Great Lakes Basin and the Groundwater Aquifers
    - The Current and Potential Future Regulatory Framework, Including the 2001 Great Lakes Charter Annex Being Put Forth by the Council of Great Lakes Governors and the Recent State of Wisconsin Groundwater Legislation and the Related Activities of the Groundwater Advisory Council, Are Important Factors Which Will Impact the Framework of the Regional Water Supply Plan

Southeastern Wisconsin Regional Water Supply Planning Program Overview And Challenges

OBJECTIVES

Objective No. 1—Support of Existing Land Use Patterns and Support and Guidance for Planned Land Use Patterns

A regional water supply system which, through its capacity and efficiency, will effectively serve the existing regional land use pattern, promote the implementation of the regional land use plan, and identify any constraints to development in subareas of the Region which may require refinement of the regional land use plan.

Objective No. 2—Conservation and Wise Use of the Surface Water and Groundwater Supplies

A regional water supply plan which conserves and wisely utilizes the surface water and groundwater supplies of the Region so as to sustain those supplies for future, as well as existing needs.

Objective No. 3—Protection of Public Health, Safety, and Welfare

A regional water supply system which protects the public health, safety, and welfare.

Objective No. 4—Economical and Efficient Systems

The development of water supply facilities, operational improvements, and policies, that are both economical and efficient, best meeting all other objectives at the lowest practical cost, considering both long-term capital and operation and maintenance costs.

Objective No. 5—Responsive and Adaptive Plans

The development of water supply systems, operations, and policies which are flexible, adaptive, and rigorous in response to changing conditions.

Southeastern Wisconsin Regional Water Supply Planning Program Overview And Challenges

Example of Objectives and Standards

OBJECTIVE NO. 2—CONSERVATION AND WISE USE OF THE SURFACE WATER AND GROUNDWATER SUPPLIES

A regional water supply system which conserves and wisely utilizes the surface water and groundwater supplies of the Region, so as to sustain those supplies for future, as well as existing needs.

STANDARDS

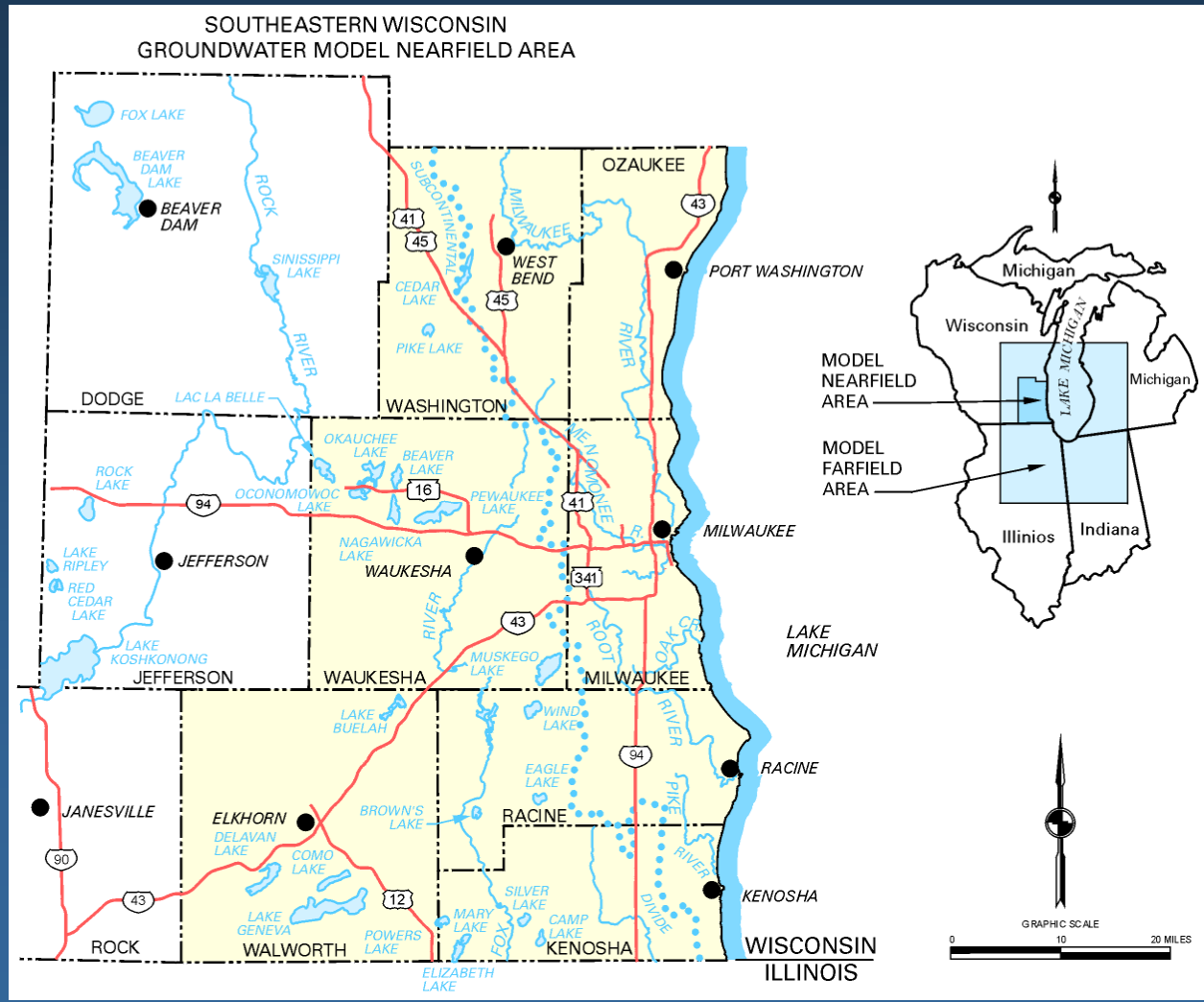
1. **The use of the deep sandstone aquifer should be managed so that the potentiometric surface in that aquifer is sustained as determined by the use and recharge within the Southeastern Wisconsin Region. Declines in the potentiometric surface of the aquifer within the Region due to uses in areas beyond the Region should be identified for purposes of considering interregional planning and action.**
2. **The uses of the shallow aquifer should be managed so that the aquifer yields are sustainable.**
3. **The uses of the deep and shallow aquifers should be managed so as to minimize the ecological impacts on the surface water system of the Region.**
4. **Lake Michigan as a source of supply should be utilized recognizing the constraints of the current regulatory framework and the status and provisions of the Great Lakes Charter 2001 Annex.**

Southeastern Wisconsin Regional Water Supply Planning Program Overview And Challenges

Planning Challenges

Study Area Considerations

- Basic Grid Spacing 2,500 feet, or an average of one quarter square mile
- Includes 18 Layers
- Total of about 600,000 cells



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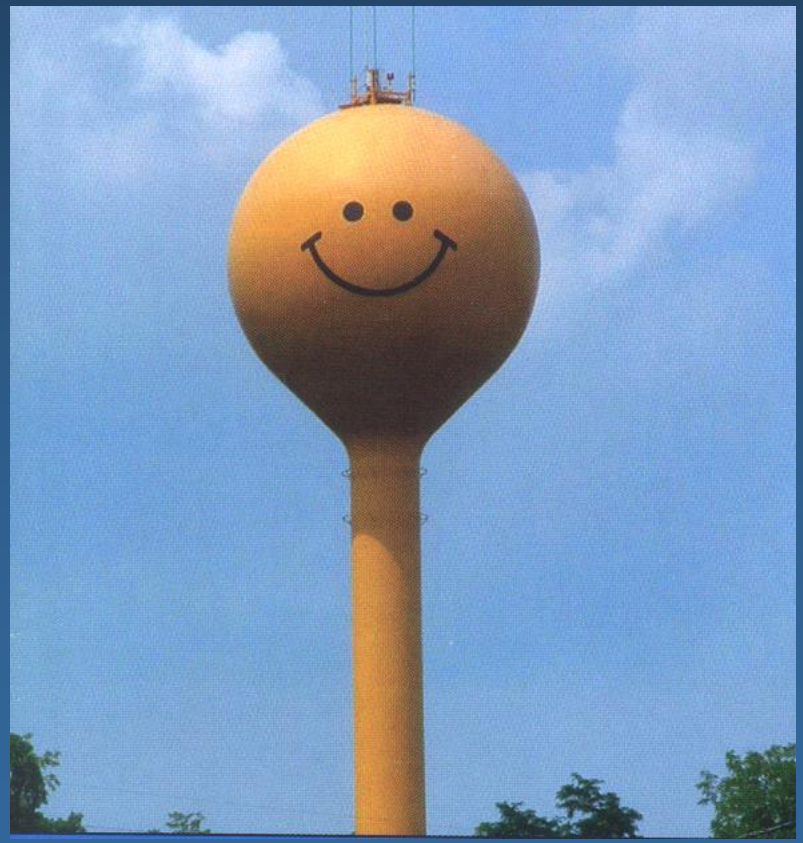
Planning Challenges

All Groundwater Use Has Consequences

Balance Groundwater Water Supply Needs With Surface Water Impacts–Reasonableness



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Planning Challenges

CHALLENGE–Integration of Water Supply Planning with Land Use and Comprehensive ("Smart Growth") Planning

- Link Reasonably Expected Water Supply Capacities As One of Several Factors Considered in Future Land Use Decisions
- Take Into Account Important Water Supply Considerations in Establishing Land Use Patterns
  - Preserve Important Groundwater Recharge Areas (Areas to be Identified in Regional Plan)
  - Protect Existing and Future Well Zone of Contribution Areas
  - Promote Local Zoning to Protect Areas Most Susceptible to Groundwater Contamination (Areas Identified in Regional Plan)

Southeastern Wisconsin Regional Water Supply Planning Program Overview And Challenges

Planning Challenges

CHALLENGE – Water Conservation

- Determine What Levels Are Achievable and At What Cost
- Balance Conservation and Economic Development Objectives
- Implementation – How to Achieve
- Issues Recently Raised – In the Background of Overall Support for Water Conservation
  - One Size Does Not Fit All
  - Major Concern—Lake Michigan Utilities With Large Excess Capacities, Existing Industry and Commerce, and Economic Development (Contrast to Tri-State Consortium Information)
  - Need to Have Revenue Stream for Water System Maintenance and Repairs
  - Remember One Purpose of Water Supply Is Conveyance of Wastes (Examples of Sewerage System Problems)
  - Definition of Conservation Varies (Lake Michigan Suppliers Use Lake Water and Then Return More Than That to the Lake, Similar for Lake Geneva Groundwater System)